

09-NOV-09 10:50:09
 GEORGIA DEPARTMENT OF TRANSPORTATION
 PRECONSTRUCTION DIVISION - OFFICE OF BRIDGE & STRUCTURAL DESIGN
 THE ANALYSIS AND DESIGN OF PIERS FOR BRIDGES - V 4.2.07 - AASHTO SPECS 1984 INTERIM
 REVISED: JUNE 30, 2008
 32' CURB-CURB; 4 BEAMS; 211' SPAN; 60' TALL; BRIDGE 2B ; PIER 16
 PROB. NO. 0001

DESIGN NO.	NO. CAN	NO. COL	NO. LLC	SKEW D	ANG M	F'C S	FC PSI	N	FY PSI	FS PSI	DESIGN DATA EC KSI	ES KSI	CONC. STRAIN	Z FACT	* MAIN SIZE	* STR TOP	* CAP MAX	REINFORCING MAX	STEEL MIN	* MIN TOP	* * CL.	* * CAP MIN DEPTH	* * CAP BOT	
D D D L	2	1	6	0-00-00		3500.	1400.	8.	60000.	24000.	3409.	29000.	0.0030	170.	11	5	16	16	11	2	2.00	4.00	3.00	2.00
COLUMN MIN.P	1.00	8.00	2.50	3.750	2	2.00	0.70	0.90	1.00	1.00	0.75	14.79	0.120	0.000	3.00	9.00	1.250	1.000	3.000	235.000		-9.999		

CAP DATA

CN	C	L	A	DE	BC	BE	DH	LH	XB1	XB2	XB3	XB4	XB5	XB6	XB7	XB8
11	L	17.625	4.000	4.000	6.000	6.000	5.000	13.625	14.000	9.333	0.667					
12	2	SAME AS CANTILEVER 1														

COLUMN DATA

CN	P	I	T	S	HT	A	DT	BT	DB	BB	DL	FLEX	ND NB	SZ ND	NB SZ	ND NB	SZ ND	NB SZ	SLOPE	EP	AP						
21	0	V	T		60.000	7.000	8.000	6.000	10.250	6.000	7.000	0.000	8	6	11	10	6	11	22	16	11	29	16	11	0.000	0.000	0.000

FOOTING DATA

CN	S/P	B	D	T	DEL.B	DEL.D	DEL.T	R.B/D	R.D/B	S.HT.	NP	SYM.	BP	DP	SET.
31	P	12.250	12.250	3.000	0.500	0.500	0.250	1.000	1.000	2.500	4	3	0.000	0.000	0.000
SUPERSTRUCTURE AREA*STD. WIND ON SUPERSTRUCTURE INTENSITIES * WIND FORCE ARM * WIND ON PIER TRANS. LONG. WIND FT1 FL1 FT2 FL2 FT3 FL3 FT4 FL4 FT5 FL5 WIND FT1 FL1 FT2 FL2 FT3 FL3 FT4 FL4 FT5 FL5 APT APL PT PL 2223. 6670. 1 50 0 44 6 41 12 33 16 17 19 7.771 7.771 7.676 17.837															

STD. WIND TRANS.	* WIND ON LONG.	WIND ON SUPERSTRUCTURE FT1 FL1	FT2 FL2	FT3 FL3	FT4 FL4	FT5 FL5	INTENSITIES	* STD. WIND TRANS.	* WIND ON LONG.	WIND ON LIVE LOAD FT1 FL1	FT2 FL2	FT3 FL3	FT4 FL4	FT5 FL5	INTENSITIES	* LENGTHS OF TRANS.	OF LL LONGI.	* WIND ON LL APT	LL ARMS APL						
1	50	0	44	6	41	12	33	16	17	19	1	100	0	88	12	82	24	66	32	34	38	210.9	632.8	16.375	16.375

CENTRI. FT	TRACTION FL	FORCE APT	MISCELLANEOUS FORCES AND ARMS APL	EXPANSION COEFFICIENT	SHRINKAGE COEFFICIENT	STREAM PT	FLOW PL
0.000	21.149	16.375	16.375	0.00018000	0.00044000	0.000	0.000

DEAD LOAD SUPERSTRUCTURE AND LIVE LOAD CASES

I.D.	NL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
D.L.	0	531.690	551.480	0.000	0.000	559.640	554.280						
LL01	1	33.540	75.820	0.000	0.000	96.600	149.070						
LL02	1	150.630	97.610	0.000	0.000	75.470	32.750						
LL03	2	46.980	118.720	0.000	0.000	156.680	181.820						
LL04	2	45.760	126.400	0.000	0.000	172.080	153.960						
LL05	2	156.040	173.430	0.000	0.000	126.160	156.040						
LL06	2	184.170	158.070	0.000	0.000	118.670	47.310						

COLUMN MOMENTS(KIP- FEET), SHEARS(KIPS), REACTIONS(KIPS)

LOAD	F.AT	CL.CAP	TRANSVERSE							LONGITUDINAL					
			COL	PC	MT	V	MB	RF	ML	MR	MT	V	MB	MF	
UNIT			1	0.000	-7.000	1.000	60.000	0.000	0.000	0.000	7.000	1.000	60.000	60.000	
DEAD LOAD TOTAL			1	2421.302 2856.565	354.343	0.000	-354.343	2856.565	10874.426	-11228.769	0.000	0.000	0.000	0.000	
TRAC. FORCE 1 LN			1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-494.358	-21.149	-1615.255	-1615.255	
WIND ON SUBSTR.			1	0.000	-53.732	7.676	460.560	0.000	0.000	0.000	-124.859	-17.837	-1070.220	-1070.220	
GROUP 2 WIND 1 1			1	0.000	-1695.529	118.826	7993.307	0.000	0.000	0.000	-124.859	-17.837	-1070.220	-1070.220	
GROUP 2 WIND 1 2			1	0.000	-1695.529	118.826	7993.307	0.000	0.000	0.000	124.859	17.837	1070.220	1070.220	
GROUP 2 WIND 2 1			1	0.000	-1498.513	105.488	7089.377	0.000	0.000	0.000	-715.994	-57.857	-3782.416	-3782.416	
GROUP 2 WIND 2 2			1	0.000	-1498.513	105.488	7089.377	0.000	0.000	0.000	715.994	57.857	3782.416	3782.416	
GROUP 2 WIND 3 1			1	0.000	-1400.005	98.819	6637.413	0.000	0.000	0.000	-1307.130	-97.877	-6494.611	-6494.611	
GROUP 2 WIND 3 2			1	0.000	-1400.005	98.819	6637.413	0.000	0.000	0.000	1307.130	97.877	6494.611	6494.611	
GROUP 2 WIND 4 1			1	0.000	-1137.318	81.035	5432.173	0.000	0.000	0.000	-1701.220	-124.557	-8302.741	-8302.741	
GROUP 2 WIND 4 2			1	0.000	-1137.318	81.035	5432.173	0.000	0.000	0.000	1701.220	124.557	8302.741	8302.741	
GROUP 2 WIND 5 1			1	0.000	-611.943	45.467	3021.694	0.000	0.000	0.000	-1996.788	-144.567	-9658.838	-9658.838	
GROUP 2 WIND 5 2			1	0.000	-611.943	45.467	3021.694	0.000	0.000	0.000	1996.788	144.567	9658.838	9658.838	

GROUP	WIND	1	1	1	0.000	-1001.637	56.738	4008.740	0.000	PIER-32-4-211-60.OUT	0.000	0.000	-37.458	-5.351	-321.066	-321.066
GROUP 3	WIND 1	2	1	1	0.000	-1001.637	56.738	4008.740	0.000	0.000	0.000	0.000	37.458	5.351	321.066	321.066
GROUP 3	WIND 2	1	1	1	0.000	-883.375	50.206	3544.272	0.000	0.000	0.000	0.000	-392.299	-24.951	-1714.686	-1714.686
GROUP 3	WIND 2	2	1	1	0.000	-883.375	50.206	3544.272	0.000	0.000	0.000	0.000	392.299	24.951	1714.686	1714.686
GROUP 3	WIND 3	1	1	1	0.000	-824.244	46.939	3312.038	0.000	0.000	0.000	0.000	-747.140	-44.550	-3108.305	-3108.305
GROUP 3	WIND 3	2	1	1	0.000	-824.244	46.939	3312.038	0.000	0.000	0.000	0.000	747.140	44.550	3108.305	3108.305
GROUP 3	WIND 4	1	1	1	0.000	-666.561	38.230	2692.746	0.000	0.000	0.000	0.000	-983.701	-57.617	-4037.386	-4037.386
GROUP 3	WIND 4	2	1	1	0.000	-666.561	38.230	2692.746	0.000	0.000	0.000	0.000	983.701	57.617	4037.386	4037.386
GROUP 3	WIND 5	1	1	1	0.000	-351.196	20.811	1454.163	0.000	0.000	0.000	0.000	-1161.121	-67.416	-4734.195	-4734.195
GROUP 3	WIND 5	2	1	1	0.000	-351.196	20.811	1454.163	0.000	0.000	0.000	0.000	1161.121	67.416	4734.195	4734.195
LIVE LOAD	LL01		1		355.030	1714.400	0.000	-1714.400	355.030	823.412	-2537.812	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL02		1		356.460	-1753.647	0.000	1753.647	356.460	2564.366	-810.719	0.000	0.000	0.000	0.000	0.000

COLUMN MOMENTS(KIP- FEET), SHEARS(KIPS), REACTIONS(KIPS)

LOAD	COL	PC	MT	TRANSVERSE						LONGITUDINAL			
				V	MB	RF	ML	MR	MT	V	MB	MF	
LIVE LOAD	LL03	1	504.200	2064.919	0.000	-2064.919	504.200	1211.786	-3276.706	0.000	0.000	0.000	0.000
LIVE LOAD	LL04	1	498.200	1727.989	0.000	-1727.989	498.200	1230.549	-2958.537	0.000	0.000	0.000	0.000
LIVE LOAD	LL05	1	611.670	-220.609	0.000	220.609	611.670	2993.958	-2773.349	0.000	0.000	0.000	0.000
LIVE LOAD	LL06	1	508.220	-2099.920	0.000	2099.920	508.220	3316.093	-1216.173	0.000	0.000	0.000	0.000

CAP ANALYSIS AND DESIGN DATA

CAP MOMENTS AND SHEARS

POINT	D.L.TOT.	MOMENTS(KIP- FEET)						SHEARS(KIPS)					
		G1 MAX.+	G1 MAX.-	G2 MAX.+	G2 MAX.-	G3 MAX.+	G3 MAX.-	DL T.LT	DL T.RT	G1 + LT	G1 + RT	G1 - LT	G1 - RT
P 1	-34.158	-34.158	-34.158	-34.158	-34.158	-34.158	-34.158	-19.786	-710.983	-19.786	-710.983	-19.786	-1110.816
P 2	-6999.547	-6999.547	-10731.189	-6999.547	-6999.547	-6999.547	-9234.063	-787.887	-1504.811	-787.887	-1504.811	-1187.720	-2247.814
P 3	-8005.557	-8005.557	-12232.781	-8005.557	-8005.557	-8005.557	-10536.830	-1511.739	-1511.739	-1511.739	-1511.739	-2254.742	-2254.742
C 1L	-14136.753	-14136.753	-21335.990	-14136.753	-14136.753	-14136.753	-18447.674	-1553.859		-1553.859		-2296.862	
C 1R	-14597.398	-14597.398	-21711.127	-14597.398	-14597.398	-14597.398	-18857.117		1593.834		2328.718		1593.834
P 4	-8306.302	-8306.302	-12480.496	-8306.302	-8306.302	-8306.302	-10805.819	1551.714	1551.714	2286.598	2286.598	1551.714	1551.714
P 5	-7273.630	-7273.630	-10957.656	-7273.630	-7273.630	-7273.630	-9479.634	1544.786	817.254	2279.670	1211.985	1544.786	817.254
P 6	-34.157	-34.157	-34.157	-34.157	-34.157	-34.157	-34.157	740.350	19.786	1135.081	19.786	740.350	19.786

PT.	M+ UNF. K-FT.		M- UNF. K-FT.		TOP REINFORCE. AS NO.SIZE		BOT.REINFORCE. AS NO.SIZE		CAP DESIGN DATA LEFT STIRRUPS M.SP. AV/IN BAR&SPAC		RIGHT STIRRUPS M.SP. AV/IN BAR&SPAC		D IN.	FC PSI	PS %	FS/FF RATIO	FS/FZ RATIO
	M+	UNF.	M-	UNF.	AS	NO.SIZE	AS	NO.SIZE	M.SP.	AV/IN	M.SP.	AV/IN					
P 1	-26.275	-26.275	3.12	2 # 11	3.12	2 # 11	0.00	0.000 #5@ 0.00	24.00	0.217D#5@ 5.71	63.96			0.07	0.000	0.094	
P 2	-5384.268	-7103.126	24.17	16 # 11	3.12	2 # 11	24.00	0.087 #5@ 7.13	12.00	0.291D#5@ 4.26	105.06			0.36	0.609	0.982	
P 3	-6158.121	-8105.254	26.88	18 # 11	3.12	2 # 11	24.00	0.281D#5@ 4.41	24.00	0.281D#5@ 4.41	108.00			0.39	0.596	0.965	
C 1-10874.426-14505.475	49.42	32 # 11	3.12	2 # 11	12.00	0.291D#5@ 4.26	12.00	0.297D#5@ 4.17	108.00					0.70	0.651	0.908	
P 4	-6389.463	-8312.169	27.45	18 # 11	3.12	2 # 11	12.00	0.287D#5@ 4.32	12.00	0.287D#5@ 4.32	108.00			0.40	0.603	0.989	
P 5	-5595.100	-7292.026	24.70	16 # 11	3.12	2 # 11	12.00	0.297D#5@ 4.17	24.00	0.092 #5@ 6.77	105.06			0.37	0.617	1.009	
P 6	-26.275	-26.275	3.12	2 # 11	3.12	2 # 11	24.00	0.225D#5@ 5.51	0.00	0.000 #5@ 0.00	63.96			0.07	0.000	0.094	

NOTE: *** FS/FZ RATIO EXCEEDS 1.0! ***

COLUMN ANALYSIS AND DESIGN OUTPUT

CN	T B	CRITICAL COLUMN LOADS												B	D				
		GR	LLC	WC	R	E S	C F	S F	PF	MTF	MLF	PM	MTM			MLM	PU	MTU	MLU
1	T	1	LL03	0.0				4242.3	4943.6	0.0	4242.3	6262.7	4471.9	8393.9	12392.5	8848.9	1.979	72.00	96.00
1	B	2		5.1	R			3713.5	-4388.812556.5	3713.5	5355.7	18646.3	3667.2	5299.6	18451.1	0.989	72.00	123.00	

CN	T B	COLUMN DESIGN DATA												CM	R	PHIC
		B FACE 1 NO.SIZE	B FACE 2 NO.SIZE	D FACE 3 NO.SIZE	D FACE 4 NO.SIZE	AS	PS	BD12	BD	SUMPU	SUMPC	DEL.T	DEL.L			
1	T	15 # 11	15 # 11	8 # 11	8 # 11	71.76	1.038	1.00	0.093	4525.	21484.	1.267	1.757	1.000	2	0.70
1	B	7 # 11	7 # 11	26 # 11	26 # 11	102.96	1.163	1.00	0.236	3431.	19004.	1.220	1.485	1.000	2	0.70

FOOTING 1 DESIGN LOADS

F G	LLID	WC	ES	C	S	P	MT	VT	ML	VL	P4	P3	P2	P1	MTF	VBF	VPF	LOAD
1	3	LL03	4.1R			3295.802	-4845.956	-38.230	7267.896	99.915	210.443	107.033	190.207	293.618	243.396	31.815	61.795	MAX.P1

PIER-32-4-211-60.OUT																
1	3	LL03	4.1R		4284.542-6299.742	-49.699	9448.264	129.889	273.576	139.142	247.270	381.703	316.414	41.359	80.333	MAX.MT
1	3	LL03	4.1R		4284.542-6299.742	-49.699	9448.264	129.889	273.576	139.142	247.270	381.703	316.414	41.359	80.333	MAX.VT
1	3	LL03	5.1R		4284.542-4689.584	-27.05410354.116	142.629	294.378	147.032	226.467	373.814	300.209	39.234	80.333	MAX.VP	
1	3	LL03	5.1R		4284.542-4689.584	-27.05410354.116	142.629	294.378	147.032	226.467	373.814	652.949	53.116	80.333	MAX.ML	
1	3	LL03	5.1R		4284.542-4689.584	-27.05410354.116	142.629	294.378	147.032	226.467	373.814	652.949	53.116	80.333	MAX.VL	
1	5		4.1R	E	2856.565-5786.516	-81.035	8302.741	124.557	187.382	68.363	171.436	290.455	229.458	30.190	53.957	MAX.P3

FOOTING 1 ANALYSIS/DESIGN RESULTS

FOOTING SIZE			* BAR REINFORCEMENT STEEL *							SECTION CAPACITIES			
B	D	T	P1/PA	AS	NO.SIZE	SPAC.	PLACEMENT	MT.	VB	VP	DS	FC	
27.000	27.000	6.500	1.000	1.44	31 #10	@10.375	TOP TRAN	391.926	73.565	147.131	60.955	0.000	
				2.41	42 #11	@ 7.625	BOT.LONG	657.993	75.183	150.365	62.295	0.000	

NUMBER OF PILES = 21 BP = 6.125 DP = 6.125